

## INVESTIGATION OF CLAY MINERALS IN SOILS FORMED UPON LIMESTONES IN THE BÜKK MOUNTAINS, HUNGARY

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This paper reports mineralogical investigation of different kind/type of soils on different limestone formations at the Bükk Mountains. Here we report the investigation of the clay fractions of the acid (5 wt% acetic acid) insoluble residues of the different limestones and soils. One soil sample and one rock sample were gathered from both Három-kő and Létras-tető hills (peak positions). The former belongs to the Bükkfennsík Limestone Formation, and the latter to the Fehérkő Limestone Formation. After general soil classification, based on the WRB (World Reference Base for Soil Resources), instrumental techniques were applied, which included X-ray powder diffraction (XRPD) and differential thermal analysis.

The bulk soil and limestone samples display totally different XRPD patterns. The Három-kő soil sample dominantly contains nano-crystalline smectite with important quartz and X-ray amorphous phase contribution, with minor albite, while the underlying limestone contains calcite, muscovite-2M<sub>1</sub>, minor quartz and important apatite. The Létras-tető soil sample shows dominant smectite, while the underlying Fehérkő Limestone Formation has important muscovite content nearby the dominant calcite. Neither soil samples contain carbonates, as calcite, or dolomite.

Thermal analyses showed similar type of organic matter in both the soil samples, where the Három-kő soil had much higher organic content. Weight losses of around 60 weight percents are characteristic for the Három-kő soil, while the Létras-tető soil showed 12–15 weight percent losses during heating up to 1100 °C. The XRPD data of the < 2 µm fraction of soils and limestone residues were compared by the means of oriented clay mineral specimens investigated in air-dried, ethylene-glycol saturated states and after heating to 350°C. The Három-kő soil and limestone samples show no common features. The soil is characterized by almost amorphous smectite (chlorite?) and illite/smectite with poorly crystalline illite (or muscovite) and kaolinite. On the contrary, the limestone is characterized by well-crystallized muscovite-2M<sub>1</sub>, with only minor amounts of smectite and kaolinite, where quartz is not present. The Létras-tető soil is characterized by illite/smectite with high smectite ratio (diffraction peak at *ca.* 12 Å), poorly crystallized kaolinite and minor amount of illite. Minor amount of quartz is also present. The limestone residue sample here is similar to the other limestone. It is again quartz dominated with muscovite-2M<sub>1</sub> and has minor smectite and kaolinite component.